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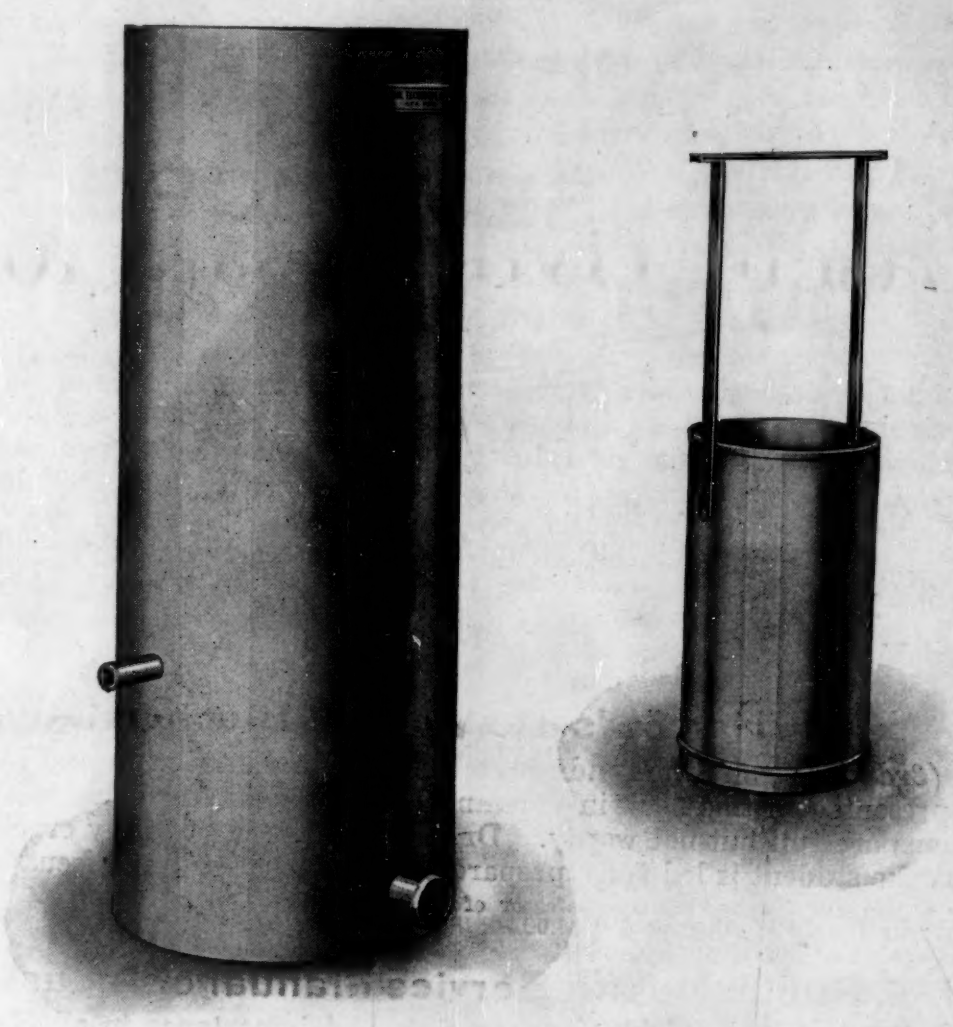

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WARFARE AND NATURAL RESOURCES[1]

By Professor HENRY BALDWIN WARD

UNIVERSITY OF ILLINOIS

THE current literature of the day is replete with vivid pictures of the tremendous struggle in which our nation is involved. Our magnificent isolation between two great oceans has vanished like a dream of the night. What our school books have called a continent is after all only an island, nearer to Europe and Asia than England was to Napoleon.

We are forced to ask ourselves, What of the future? Can we meet the demands of a new era or must we face the realization of the historian's vision that saw the decline of western lands and the passing of power to new nations?

As nation after nation fell into the hands of the plotter, we waited and watched with fatuous confidence that such things could not happen here. Rudely awakened from our dream we are bewildered by vast and urgent demands of a war front that girdles the globe and involves all nations. Confusion is the order of the day. The conflict allows of no compromise, and we are committed to the defense of our freedoms. We must win the war. Every activity, every interest must be subjected to the acid test that will decide its relations to our purposes.

Among the topics which have loomed large in public discussion, no one has demanded in recent years more general attention than that of our natural resources. What then could be more appropriate for the annual conference of the Texas Academy of Science than your program with its discussion of the relations of natural resources to war, the foremost obligation of this nation to-day.

[1] Invitation lecture at the annual meeting of the Texas Academy of Science, November 13, 1942.

The concept of natural resources has often been far too narrowly interpreted. Writers list a few things in the environment which man uses profitably and have been content to rest the case there. The nomads who ranged over these plains of Texas before the white man came might have listed its resources—if they ever cherished such a concept—as fish, food and furs. From these resources they could eke out a precarious existence and develop a simple culture for a scanty population. From those same lands the Texans of to-day have built up wealth, are supporting in comfort a large and growing population, and have a highly developed culture that is founded on resources of which the red man had no intimation. Not only that. From the record of the past fifty years, one may predict with reasonable certainty that in another half century the state will support a much larger population, with greater comfort, security and happiness than it does to-day. The student of science sees definitely that advances in the past open the way to greater achievements in the future.

Natural resources really include all the many and varied types of things found in the world about us, the living and non-living materials that nature furnishes in the vast and little understood complex we call environment. Even imperfect acquaintance with the North American continent compels one to acknowledge that it is remarkably well supplied with natural resources. Few items are entirely lacking, and most of those regarded as of vital importance are present in large amounts.

The amount of non-living resources is definitely limited. When the supply fails substitutes alone can relieve the need. No such limitation affects the supply of biological resources. The power of reproduction present in living things makes it possible under proper conditions to produce a new supply and thereby make good the inroads of the past. This power of life is immensely valuable, for it affords the only chance for future increase in the amount of resources available. At the same time it is also dangerous. Living things are easily destroyed and once a particular type has been exterminated, it can not be restored. Furthermore, when the supply of a given type of life has been reduced to low terms, the process of recovery is slow at best and to restore the type may prove impossible.

In considering the effects of war on biological resources their characteristics are all of serious import. In nature such resources are favorably or unfavorably affected by changes in the environment and as the result types of animal or plant life are held in balance, become dominant or are wiped out. Natural recovery is slow. When man enters the picture, losses are speeded up. Modern man has been called the great destroyer and in the present machine age effects marvelous changes in brief time.

Men talk in various ways about values and basic resources; but after all there is only one measure of value. Life alone counts. Without life, a world of air, water, soil, metals, fuel and all else would be meaningless to us. Natural resources acquire value only because of life and in the present world for man primarily and ultimately.[2] Conservation must be defined in terms of *human use* and that is in values for present and future needs of man. Too often in the past we have put our eyes to a microscope and focused that on the details of a tree. We have been so absorbed in such details and their analysis that we have never once thought of the forest as a living thing.

The world about us is a unit, its parts bound together by life in an all-embracing complex and so intimately related that interference at any point effects changes often unpredicted in extent and character. By the discovery of new natural resources man advantages himself and his age. He has also been able to devise more effective methods and even to create new substances. Ultimate success in the handling of natural resources demands vision as well as ability and energy.

Fate of Resources in War

The general effect of war on the natural resources of the regions and nations involved is unmistakably clear. War is a carnival of waste. The impoverishment of ancient fertile soils in Northern Africa by prolonged warfare has created the desert of to-day in which a scanty population of destitute nomads ekes out a hand-to-mouth existence. War started the process of destruction and ignorance and carelessness promoted it. Destruction of water control systems by violence, loss of fertile soils by consequent erosion, laying waste of forests, farms and cities by continued strife completed the general ruin of a once beautiful and resourceful region. History is full of such records. Conservation even in wartimes is an absolute essential.

During wars the destruction of natural resources is redoubled. Protective measures are neglected and constructive work is abandoned. Even the victor in the struggle is heavily penalized, for warfare is in fact doubly destructive. Each contestant strives to reach and destroy the most and best in the resources of his opponent, while at the same time he is expending without stint his own possessions. These expenses have grown apace as man's capacity to construct and operate machines has developed.

The fighting forces must be provided with food and

[2] This point of view has been more fully set forth in my recent book on "The Foundations of Conservation Education."

equipment no matter how the rest of the population fares. This is the correct policy; we all agree for we must win. But how tremendous the drain on the nation's resources. Even nations which firmly resolve to keep aloof from war and remain at peace may suffer none the less heavily, as witness the fate of Norway and Holland to-day.

CONDITIONS IN THE UNITED STATES

The general conditions just outlined represent in varying degree the experiences of all nations but especially those which in the Old World have been entangled in strife for centuries. It was from those peoples that men and women sought the freedom of the New World. They saw in the rich virgin territory and in the lands across great oceans relief from the ever impending destruction of lands and crops as well as homes and lives. This is our first national experience in a struggle which calls for total devotion of ourselves and all we have to the defence of our freedom. As we survey the past record of this land and its resources what do we see?

The bold adventurers who first landed on the eastern shores found dreams of wealth and ease fade fast as they fought long and hard for a victory that at times seemed none too certain. At every forward step in the conquest of the continent the pioneers paid a heavy price for their advances. Nor did they know much of the abundant resources existing in lands over which they won control. It was left for later generations to dig the mines, exploit farms and forests, harness the waters and reap rich harvests in the domain that the pioneers had bequeathed to them. For two hundred years the pioneers toiled and pinched and saved. Those who came after them have talked and promoted and wasted.

In the last century the record of our nation in handling its natural resources is a sorrowful tale. Too many of us have been content to live an easy life, ever seeking new ways to find wealth and scatter it on pleasure with little thought of the nation and its future.

No continent is so richly supplied with all natural resources that it can meet every demand that may be made upon it. Confronted to-day by extraordinary demands for war purposes, we are startled to learn that the supply of certain resources is no longer "unlimited," as had often been asserted in the past. Science is at once called upon to solve the problem.

Substitutes may be found or new methods achieve the desired result. In all such work the immense mass of detail piled up by the research of past workers is invaluable. So the nation has called into service the best talent of university and technical laboratories and sets it to work on the problems of war. New methods and new products increase the supply of natural resources and the variety of functions which they can serve. From the partial reports which have reached the public ear it is already evident that the study of war problems has yielded discoveries and inventions of great value for human life.

New processes of diverse character use wood to replace metals. At the other extreme wood products are woven into garments for winter clothing or of the delicate character of my lady's sheerest stockings. The waste of paper and pulp mills becomes basic material for making rubber. In the hands of the scientific experimenter glass is spun into fibers for the daintiest of gowns; it becomes the lightest of foams in the life-saving suit of a shipwrecked sailor or in other form serve him as a bullet-proof shield.

The pressure of wartime demands has yielded countless such extraordinary products. Under conditions of peace all of them might have been produced sometime but surely in no such brief period. Warfare is terribly destructive of natural resources but it also raises the tempo of new production. Life after the war has ended will follow new lines: it will not be anything like that in the days before the war. The nations of the earth are paying a ghastly price for these reforms. But more than ever before the return will be larger because science has been put to work.

Warfare like other periods of social disturbance affords favorable opportunities for looting the public treasury. But the endowment of the nation includes other resources even more valuable than its cast. And careful attention has not been paid to the expropriation of natural resources. Careful students have estimated that more than one half of the natural resources that the continent originally possessed has disappeared within the first two hundred and fifty years of our history.

One conspicuous example, a bad habit characteristic of our country and serious even under peace conditions, becomes even more threatening in wartimes. I refer to the pollution of lakes and streams by municipal and industrial wastes. The practise has grown with increase in population and industrial plants until it threatens not only the welfare and health of our people but even their very existence. No other civilized nation in the world gives such license to these practises as we have. Public opinion here has been indifferent probably because of ignorance and failure to recognize the problem in its true light.

In World War I stream pollution flared up suddenly like an epidemic and spread like the plague. Whole rivers were loaded with poisonous chemicals such as the waste products from ammunition plants, and the streams became foul and lifeless. Such conditions are not "inevitable," as some have said. Since

the practise has been condoned for more than a century and despite the protests of conservationists tolerated during easy times of peace, it is too much to hope that it can be corrected in the strenuous days of wartime. Yet despite all excuses that are offered for the practise, pollution is *waste*. And the country will in some future day pay for to-day's bad habits and thoughtless waste.

WHAT OF THE FUTURE?

The greatest problem of the future we face to-day is not merely the winning of the war but the condition of the world at its close. The exhaustion of natural resources has proceeded at a stupendous rate. Nations have been drained of men, money and materials.

The fate of the natural resources, usually unmentioned if not unnoticed, has a profound bearing on the future of a people and on possibilities of postwar reconstruction. History furnishes many records of change in areas where once fertile lands, famous forests and abundant water supplies were the firm foundation of prosperous and highly developed national cultures. But the armies of conquerors scourged the people and laid waste the cities. It was not the slaughter of peoples that worked the final destruction, for remnants of defeated nations or new groups have at times wandered in and built new cities on the ruins of the old. Excavations on the site of ancient Troy have demonstrated that eight cities in succession were wiped out by ravaging hordes and rebuilt later on the ruins of the past.

Earlier warfare concerned itself little with the land and its natural resources, but as time went on destruction became more widespread and intimate. To-day totalitarian warfare not only destroys life and scatters the remnant of the people but makes levies on natural resources that provide for their exhaustion. The pace of destruction in Europe has already gone to an extreme which in the past has meant abject poverty for the postwar population.

In the present war the destruction in our own country is enormous, disastrous, but not annihilating. Wisdom commands not only maximum effort and devotion to promotion of the war but also obedience to the fundamental principles of conservation. To stop work inaugurated for the protection of our natural resources, to abandon well-planned measures for their conservation will open the way to unnecessary loss at the present time and leave us at the close of the conflict without organized means of guarding whatever of these resources is left for the future. The sacrifice of plans and trained leadership is both unnecessary and unwise. The foundation of conservation is biology; the bulwark of the cause is education. On teachers of biology rests the responsibility of rebuilding their courses to fit the needs of a new era. Dry-as-dust details must be eliminated; more of life, its relations, its meaning and its needs must be introduced. Courses overburdened with technical details will never train general students to be good citizens, to understand values, to fight fads or to detect political or commercial deceit. The success and permanent progress of our country must rest on well-trained and well-balanced public opinion. That can only come through the scientific attitude and good teaching.

THE NORTH AMERICAN RAGWEEDS AND THEIR OCCURRENCE IN OTHER PARTS OF THE WORLD

By H. A. ALLARD
BUREAU OF PLANT INDUSTRY, WASHINGTON, D. C.

THE pollens of the ragweeds (Ambrosia) are responsible for most of the so-called autumnal "hay-fever" discomforts which allergic persons in the United States experience during August and September. In the East, the giant ragweed, *Ambrosia trifida* L., and the low ragweed, *A. artemisiifolia* L., are the two species mainly responsible for these allergic troubles. Both were originally native to North America.

The flowering period of these ragweeds extends from early August into October, and farther south may even begin in late July in some instances. The author's studies, bearing on the relation of flowering to length of day, have shown that the flowering time of these plants, as in the case of many others, depends upon particular lengths of day. After the summer days have shortened sufficiently, the flower primordia are laid down, and the continued decrease in length of day as summer progresses causes anthesis of the staminate and pistillate flowers which, in the monoecious ragweeds, are borne on the same plant. In brief, these ragweeds withhold flowering until the days have shortened to their requirements, and they have been termed short-day plants for that reason.

Length of day appears to be one of the most important factors of climate concerned with the final stature and latitudinal distribution of these plants.

In latitudes where very long days prevail around the summer solstice favoring a long pre-reproductive vegetative phase of development before flowering is initiated, the plants merely increase their stature with leafy branches. When the days have finally reached the critical length for flower formation, these plants, as a result of their large size, are enabled to produce enormous quantities of pollen.

In higher latitudes, however, due to lower mean temperatures and a shorter frost-free season, a point is reached where the ragweeds can no longer fruit successfully before frost. This failure to produce seed establishes definite limits of range wherever the plants grow, whether in the region of their native home or in other cold temperate regions where they are aliens.

It is interesting to note that the ragweeds have a very sparse and precarious distribution north of latitude 50°. In North America the giant and the low ragweeds scarcely reach the Gulf of St. Lawrence, and they are not listed and apparently do not occur in the Alaskan area, most of which lies north of 55° to 60°.

These weeds have been unintentionally introduced into the British Isles and Europe many times, but they have not successfully established themselves in the British Isles, Scandinavia, Belgium, Holland and most of Germany, all of which countries lie mostly or entirely north of the parallel 50°. The principal regional and local floras of these countries either fail to mention these plants altogether or record them as mere casuals, appearing one season but failing to persist. R. L. Praeger lists no ragweeds in his flora ("Irish Topographic Botany," 1901) of Ireland, which lies between the latitudes 51° and 55° 23′ north.

In middle latitudes lying near 32° to 35°, these ragweeds appear to naturalize readily, for they are abundant in Madeira and also in Bermuda, both island groups lying near 32° north. Conditions do not appear to be especially favorable for the ragweeds in Portugal, Spain, Italy or even in France, for the more important floras either do not list them at all or report them as merely local or casual species. In Portugal and in Spain they are considered very unimportant components of the flora.

In North America, the most favorable length of day for the maximum reproduction of these plants appears to lie roughly between 45° and 30° to 35°, and these limits should also apply throughout Europe and Asia, and in similarly situated land areas in the southern hemisphere, provided such other conditions as soil moisture and temperature are also favorable.

It is now of considerable additional interest to learn the status of the ragweeds in subtropical or equatorial areas in so far as local and regional floras have revealed their occurrence here. The ragweeds do not appear to exist, or are of extremely rare occurrence, in all parts of India, Burma, the Malay Peninsula, Indo-China, China proper, the Philippines, Egypt, in North Africa and in the tropical and sub-tropical islands of the Pacific. In Australia they have been reported only from the extreme southern portion, below latitude 30° south. Low ragweed has been reported as an alien in Japan, but the locality was not given and it may be only sporadically naturalized. However, the principal islands covered by the Japanese empire lie mostly between the latitudes 32° and 45° north. On a length-of-day basis these should afford a highly favorable region for the successful naturalization of our common American ragweeds, which flourish between these latitudes in North America. There is every reason to believe that the ragweeds are of little or no importance in the flora of Oceania, comprising the islands lying between the two parallels 20° south and 20° north. Otto Degener mentions no ambrosia in his flora of the Hawaiian Islands ("Flora Hawaiiensis," 1940), these islands lying between the latitude 18° 54′ and 22° 15′ north. They do not appear to occur in New Zealand, near 40° south.

Since the American ragweeds reach northern Mexico but seem to disappear southward, and they are not reported in any of the better known Central American floras, it is indicated that these plants as they occur in the United States can not adapt themselves to tropical or equatorial conditions. Whereas the days were too long in far northern latitudes, there is reason to believe that failure to naturalize in the warm tropics is due to lengths of day that are now too short. This phase of ragweed behavior will not be discussed here, however.

On the basis of the known distribution of ragweed, its very definite autumnal flowering in response to a shortening length of day in extra-tropical latitudes, and its seeming absence in tropical regions, certain conclusions may be drawn.

In Alaska allergics will experience no trouble with ragweed pollens. In Europe north of 50° they will find little, if any, inconvenience from any of the ragweeds. In southern Europe, more especially in the warmer coastal sections and along the warmer river valleys of southern France and Italy, the ragweeds may be expected to occur, but even here they do not appear to occur with the same widespread abundance and persistence that characterize them in American fields and waste places. In practically all parts of India, China, Burma, Indo-China, the Malay States and Egypt, so far as any published lists reveal, they will find no ragweeds to bother them.

In subtropical and equatorial regions allergics should have no trouble with the temperate region rag-

weeds, and even the tropical species appear to be sparsely represented.

They should not be subjected to ragweed pollens in Oceania between the latitudes 20° N. and 20° S. This zone includes practically all the large islands of the Pacific area between Japan and Australia where fighting has been in progress since our entry into the war.

South of the equator, in southern temperate latitudes, the ragweeds appear to show a distribution in response to length of day and other factors similar to that of the north temperate zone. The flowering season, however, is now related to the south temperate summer and fall season, which occurs from December to March and April.

Even in European regions where ragweed might occur as a casual, it will be limited to very low altitudes, owing to its requirements for particular conditions of seasonal warmth. In eastern North America, and in these middle latitudes where the seasonal length of day favors its optimum success as a vigorous and abundant weed, the plant disappears near altitudes of 3,200 feet, as in the Cabin Mountains of West Virginia. It is small and a rather localized component of the flora at Davis, West Virginia, at an elevation of 3,100 feet. Temperature alone operates at these altitudes, since the summer mean temperatures are very low, the season of growth between spring and autumn frosts short, and unfavorably low temperatures are likely to occur at any time during the growing season.

While it is recognized that allergic persons are affected by the pollens of particular groups of related plants in a family, rather than by a single species, because their pollens appear to have certain irritant principles in common, the ragweeds must still be considered major offenders wherever they occur abundantly. This is recognized in the United States and in the temperate regions of South America, more especially in parts of Argentina where certain species are very abundant, and where two to three per cent. of the population is allergic from one cause or another.

From this survey of the occurrence of the ragweeds (Ambrosia), in temperate and tropical latitudes, as revealed by the principal floras of the world, it seems safe to conclude that American soldiers campaigning in most of Europe, in the tropical regions of Asia, Africa and the warm tropical islands of Oceania, lying between 20° N. and 20° S., will have little to fear from troublesome ragweed pollens, even though they may have been allergic to such in America.

OBITUARY

JAMES McGIFFERT
1868–1943

ON June 18 James McGiffert passed away at Los Angeles, a few hours after he arrived at his residence in California where he used to spend his summer vacation for many years.

Of Scotch-Irish descent McGiffert was born at Stockport, Columbia County, N. Y., and received his early training in nearby Hudson. Entering Rensselaer Polytechnic Institute in 1887 he graduated in 1891 with the degree of civil engineer. After one year of postgraduate work in mathematics at Johns Hopkins he returned to his alma mater as assistant in mathematics. Three years later he entered Harvard University, where he took the degrees of A.B. and A.M. simultaneously in 1896. Resuming his career in Troy he became assistant professor in 1900, associate professor in 1920 and in 1932 full professor in charge of graduate courses and consultant to the department of mathematics. In his early years as a teacher he published, mainly for the use of his own students, "Notes on Algebra," "Problems on Mensuration" and "Mathematical Shortcuts." His growing blindness, which deprived him of his sight completely when he was fifty, did not diminish his efforts to keep up with the times. In June, 1927, when he was approaching his sixties, Columbia University awarded him the doctorate in philosophy and in the next year McGiffert published his "Plane and Solid Analytical Geometry." Shortly before his death he wrote a brief introduction to algebra and geometry for use in defense courses. An active member of the American Mathematical Society and for years on the board of editors of the *Mathematical Magazine* he frequently lectured on mathematical and allied topics.

A staunch Presbyterian and devout churchman, he conducted for many years a class for students whom he impressed as much with his knowledge of the Bible as with his wizardry in mathematics. Outside his own field he was particularly interested in language and languages (was it not Gibbs who stated that mathematics was also a language?). A purist in the matter of language, who knew and appreciated the origin and the meaning of words, McGiffert for twenty-eight years presided over and guided the destinies of the Troy Society for Spoken English, where he acquainted his fellow-Trojans with leaders of science, literature and the pulpit.

No account of his life work could be complete without mentioning Cora Emily Medway, whom he first met in his Harvard days and married shortly afterwards. Without his "Coralie," an accomplished musician, a marvelous housewife, a never-tiring reader and (by courtesy) an assistant-mathematician, his life

could never have been so complete. His superb courage and cheerful optimism in the face of adversities, among which his blindness was the most perplexing, were astonishing. What he might have accomplished without this affliction, nobody can tell. As it was, his married life was singularly happy and full, he had a host of friends, few if any were his enemies, and his epitaph may well be summarized in three simple words —loving, lovable, loved.

H. S. VAN KLOOSTER

RECENT DEATHS

DR. HENRY GRAY BARBOUR, professor of pharmacology and toxicology in the School of Medicine of Yale University, died on September 23 at the age of fifty-seven years.

THE death at the age of sixty-nine years is announced of Dr. Umetaro Suzuki, known for his work on vitamins. Dr. Suzuki was president of the Scientific Research Institute of Manchukuo and professor emeritus of Tokio Imperial University.

SCIENTIFIC EVENTS

VISIT TO THE U.S.S.R. OF BRITISH SURGEONS

IT is reported in the *British Medical Journal* that the four British surgeons who had been paying a three-weeks visit to Soviet Russia attended a reception given in their honor by the British Council immediately upon their return, and gave the assembled company some account of their experiences. This British mission was sponsored jointly by the British Council and the Medical Research Council, and its members were Surgeon Rear-Admiral G. Gordon-Taylor, consulting surgeon to the Royal Navy; E. Rock Carling, consultant adviser to the Ministry of Health, the Ministry of Home Security and the Ministry of Pensions; Major-General D. C. Monro, consulting surgeon to the British Army (War Office); and R. W. Watson-Jones, civilian consultant in orthopedic surgery to the Royal Air Force. Two American surgeons, Lieutenant-Colonel Elliott and Lieutenant-Colonel Loyal Davis, and a Canadian surgeon, Professor Wilder Penfield, accompanied them.

The visitors during their short stay in Russia inspected hospital arrangements as far forward as Vyazma on the Western front, visited the clearing field and mobile hospitals, and inspected the medical institutes and depots in Moscow. They found the organization of Russian medical services excellent. In their surgical work the Soviet medical service, with some differences in detail, follows the same general principles as those accepted in British war surgery, and has reached the same conclusions. The commissar in charge of the service stated that at the time of the last war the Russians realized that their arrangements were not as good as those of their allies, and during the twenty-five years between the two wars they have set themselves to reach a standard of medical and surgical work which will bear comparison with that of any other belligerent country.

Two points impressed the mission very greatly. One was the system of blood transfusion, which is carried out on a colossal scale. The arrangements for the collection of blood are beyond criticism, and the number of voluntary donors is very large. In one institution in Moscow a daily average of 500 to 800 donors are bled, and 90 per cent. of them are women. No woman is allowed to be bled more than seven times a year, but in practice, so large is the number of volunteers, they are not bled more than five times. They receive extra rations and also payment, but four fifths of the money received is returned for war purposes. The same procedure is followed as in this country in the use of plasma and serum. In no circumstances has the Russian Army lacked transfusion blood.

As for the medical personnel, the chief of the medical services of the Russian Army, General Smirnov, is thirty-five years of age, and an expert opinion on him given by an academician was that he not only was an admirable administrator but was held in the highest regard by his colleagues from the professional point of view. The medical service is becoming a woman's service; 90 per cent. of the doctors now under training are women, as compared with 50 per cent. in peacetime. For doctors in Russia the ordinary course before the first state qualification is five years, which is comparable with the British requirement. It takes three years to get a bachelorship and three more years to get a doctor's degree. Nurses had three years' training before the war, and this is now reduced to two years.

The Russian nurse evoked the great admiration of the visitors. Not only is she excellent at the job for which she has been trained, but she can turn her hands in spare time to any employment, even to building hospitals, involving cutting down trees, squaring timber, making window and door frames, digging out foundations. She is specially expert in the art of camouflage.

The visitors made as extensive an inspection as was possible during their brief stay. They saw something of the research institutes and medical organization in Moscow, where the civil defence and ambulance ar-

rangements impressed them. Five telephone operators are detailed every night to deal with emergency medical or surgical calls from any part of the city, and within two minutes of the receipt of the call a well-equipped ambulance, with doctor, nurse and orderly, is on its way.

RESTORATION OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS[1]

THE wrecking of the greatest pathologic and anatomic museum in the world—that of the Royal College of Surgeons—by German bombs has been described previously (The *Journal,* July 8, 1941, p. 58; February 28, 1942, p. 747). Nearly two thirds of the specimens were destroyed, including much that was irreplaceable, such as the Hunterian collection. Within a few weeks the council of the college set up a committee under the chairmanship of Professor Grey Turner to plan a new museum based on the surviving specimens and the traditions of the old but adapted to present conditions, which differ vastly from those of a hundred and fifty years ago when the museum was founded by the government's purchase of John Hunter's great collection. The museum was then the only one of the kind, but now every medical school has formed its museum. The museum will be devoted to the development, structure and functions of man and his diseases. Comparative anatomy will be retained only as far as it throws light on the anatomy and functions of the human body in health and disease. Anthropology will be retained, but greater discrimination will be used in this subject. The Hunterian collection will be restored as far as possible by replacement of the destroyed specimens and by making copies of models based on records, illustrations or recollection. It will not be separately exhibited but distributed among the appropriate sections.

It is recommended that the museum shall consist of two sections—anatomy and pathology—and that the council shall establish chairs for the control of these: chairs of human and comparative anatomy and human and comparative pathology. For reconstituting the series of anatomic dissections the committee has obtained the help of leading teachers of anatomy. The object is to display the structure of the body from every possible aspect and at all ages, comprising normal (including microscopic) anatomy, topography and applied anatomy, surgical anatomy, embryology and senile changes. Restoration of the pathologic collections offers less difficulty. Selected members of the Royal Society of Medicine are being organized to make a systematic collection. Regional pathology will be developed primarily for the expert, as the needs of the student are largely met by the museums of the medical schools. There will be sections of military surgery, forensic medicine and industrial diseases; also a historical section, which will include Hunterian and post-Hunterian relics, and one devoted to the evolution of modern surgical instruments. A new feature is a series of x-ray films or lantern slides of films and exceptional cinematographic films of surgical conditions and operations.

[1] The *Journal* of the American Medical Association.

RARE CHEMICALS

THE following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33rd, Dearborn and Federal Streets, Chicago, Ill.:

1. Sodium sulforicinate
2. Borneolglucuronic acid
3. p-Dimethylaminobenzophenone
4. p-Aminofuchsone
5. p-Dimethylaminofuchsone
6. p,p-Tetramethyldiaminofuchsone
7. N,N-Dimethylindigo $(C_6H_4C_2O\ N\text{-}CH_3)_2$
8. The (mono- or di-) methyl iodide or ethyl iodide addition products to No. 7 $[C_6H_4\ C_2O\ N\ (Ch_3)_2\ I]_2$
9. p-Toluquinaldine
10. l-Methyl phenantroxazole
11. N-Ethyl-rhodanic acid
12. N-Methyl-rhodanic acid
13. N-Methyl-2-thio-4-keto-tetrahydro-oxazole
14. N-Ethyl-2-thio-4-keto-tetrahydro-oxazole
15. 2-Methyl-4-phenyl-oxazole

THE HEADQUARTERS BUILDING OF THE AMERICAN INSTITUTE OF PHYSICS

THE American Institute of Physics has purchased a large, well-constructed, residential building at 57 East 55th Street, New York City, to be occupied as a national home office for the physicists of America. Generous contributions have already been made in a campaign that is now being conducted among American physicists and friends of physics throughout the nation to raise the necessary funds to meet the purchase price.

The seller of the property is Frederick Brown, a well-known real estate operator. It was largely because of Mr. Brown's generosity in setting the terms that the institute, which is a non-profit corporation, was enabled to make the purchase. The building was selected after a thorough search of suitable locations was made at the request of the purchaser by Paul S. Dixon, of the Equity Conservation Corporation, who arranged the transaction. Joshua Bernstein was the attorney representing the seller. The purchaser was represented by Robinson and Henson. Proposal for the purchase was first made by the Policy Committee of the institute.

This is the first time the organized profession of physics in America has owned a headquarters, the institute having occupied rented space since its founding in 1931. Need for the building arises from the phenomenal growth of the profession in the last

twenty years. In that time physics has become recognized not only as a field of study and pure research but also as a science vitally important in industry. It has always been fundamental to other sciences, including engineering and chemistry.

Developments for the war are serving especially to direct attention to physics and to the value of the physics profession to the nation. For example, the science of electronics is only one of the several branches of physics which are proving of great use in the war and hold even greater promise for post-war industrial developments. Other important branches of physics deal with optics, acoustics, x-rays, radio, spectroscopic analysis, cosmic rays and nuclear phenomena.

The American Institute of Physics is a federation of national societies including the following: the American Physical Society, the Optical Society of America, the Acoustical Society of America, the American Association of Physics Teachers and the Society of Rheology. Also associated with the institute are the American Society for X-Ray and Electron Diffraction and the Electron Microscope Society of America. The member societies and the institute publish eight technical journals which have a wide circulation throughout the world. These journals are *The Physical Review, Reviews of Modern Physics, Journal of the Optical Society of America, The Journal of the Acoustical Society of America, American Journal of Physics, The Review of Scientific Instruments, The Journal of Chemical Physics* and *The Journal of Applied Physics*. All of them are devoted to the publication of the results of research and their interpretation, of articles on the teaching of physics and the place of physics in the general culture of the modern world.

Aside from publication, the work of the institute deals with many services to physicists designed to advance the science and its contribution to modern life. These services include arrangement of meetings and conferences, furnishing information to the public and arranging cooperation with other scientific organizations and with agencies of the government. Recent war services have included authoritative assistance to the government in the use of the critical and insufficient physics manpower for war research and war operations in such fields as aircraft and submarine detection, anti-aircraft weapons, communication and secret developments.

Purchase of the building should materially accelerate a general plan of professional development in the field of physics, designed to meet post-war necessities. This plan was developed by the Policy Committee of the institute, whose members are Dr. Paul E. Klopsteg, president of the Central Scientific Company; Dr. Oliver E. Buckley, president of the Bell Telephone Laboratories; Dr. Karl T. Compton, president of the Massachusetts Institute of Technology; Dr. Homer L. Dodge, dean of the Graduate School of the University of Oklahoma, and Dr. R. Clifton Gibbs, chairman of the department of physics of Cornell University.

The plan contemplates the maintenance of high professional standards, the improvement of publications and meetings, efforts to improve the teaching of physics in high schools and colleges, the expansion of facilities and resources for research in the field of physics, rehabilitation of war-interrupted careers and extended activities designed to advance the science of physics and to facilitate the work of physicists in every way possible.

SCIENTIFIC NOTES AND NEWS

THE Frederick Ives Medal of the American Optical Society will be presented on October 8 to Dr. Lloyd A. Jones, of the Eastman Kodak Company, at the Pittsburgh meeting of the society, which will be held from October 7 to 9. The medal is awarded to Dr. Jones for "distinguished work in optics."

THE David B. Pickering Nova Medal of the American Association of Variable Star Observers was presented on September 11 to Professor Bernhard H. Dawson, of the Observatory of the National University of La Plata, for the discovery of Nova Puppis 1942. The presentation was made by Dr. Edward L. Reed, chargé d'affaires of the U. S. Embassy in Buenos Aires, at a ceremony in the new building and observatory of the Asociación Argentina Amigos de la Astronomía, a society of amateur astronomers, of which Dr. Dawson was president from 1932 to 1940.

ELLA CARR DELORIA, of New York, a Yankton Sioux Indian, since 1929 research specialist in the department of anthropology of Columbia University, received the 1943 Indian Achievement Medal on September 17, American Indian Day. The award is given annually by the Indian Council Fire of Chicago to an American Indian whose accomplishments are worthy of national recognition.

DR. WALTER H. EDDY, president of the American Institute of Food Products and consultant on food and nutrition to the quartermaster general, formerly professor of physiological chemistry at Columbia University, was recently the guest at a luncheon given in his honor at the Waldorf-Astoria, New York City.

WILLIAM RANDOLPH WALTON, senior entomologist of the Bureau of Entomology and Plant Quarantine,

U. S. Department of Agriculture, on reaching the age of seventy years has retired, his retirement to be effective on October 1, after thirty-three years of service in the Division of Cereal and Forage Insect Investigations, in which for seven years he was division leader.

PROFESSOR W. C. BRENKE, of the University of Nebraska, retired from the chairmanship of the department of mathematics on September 1. He is succeeded by Professor Ralph Hull, of the University of British Columbia. Dr. Brenke will continue his work as professor of mathematics during the current academic year.

DR. B. S. GUYTON retired as dean of the School of Medicine of the University of Mississippi at the end of August. He is succeeded by the assistant dean, Dr. James B. Looper.

DR. JACOB P. DEN HARTOG, previously associate professor in the School of Engineering of Harvard University, has been appointed professor of mechanical engineering at the Massachusetts Institute of Technology. He is now a Commander in the United States Naval Reserve and will be on leave of absence for the duration of the war to serve in the Bureau of Ships in Washington.

DR. JAMES L. WILSON, associate professor of pediatrics at the College of Medicine of Wayne University, has been appointed professor of pediatrics at the College of Medicine of New York University and chief of the children's medical service at Bellevue Hospital.

DR. PAUL F. HAHN, associate in biochemistry and experimental pathology at the School of Medicine of the University of Rochester, has become assistant professor of biochemistry at the School of Medicine of Vanderbilt University.

PROFESSOR HILTON A. SMITH, of Colorado State College, has been made associate professor of veterinary pathology at Iowa State College. Dr. Smith has also been a member of the faculties of the State College of Washington and of the Agricultural and Mechanical College of Texas.

DR. MAURICE L. TAINTER, director of research of the Winthrop Chemical Company, Rensselaer, N. Y., has been appointed professor of applied physiology at the Albany Medical College. This will not affect his relations with the Winthrop Chemical Company.

BERT H. NOREM has been appointed assistant professor of administrative engineering in the College of Applied Science of Syracuse University.

DR. ALLAN WATT DOWNIE, who since 1940 has been pathologist in charge of the Emergency Public Health Laboratory at Cambridge, England, has been appointed professor of bacteriology at the University of Liverpool.

THE Rockefeller Foundation has awarded a research grant to Dr. William C. Boyd, associate professor in biochemistry in the School of Medicine of Boston University, for the continuation of his research work on immuno-chemistry.

GILES E. HOPKINS has been appointed research manager of the Textile Research Institute. He replaces Malcolm E. Campbell, now dean of the textile school at North Carolina State College.

DR. BARRY G. KING, assistant professor of physiology at the College of Physicians and Surgeons of Columbia University, has accepted a commission as lieutenant in the U. S. Naval Reserve as physiologist. He will be engaged in medical research at the Naval Research Institute of the National Naval Medical Center, Bethesda, Md.

DR. E. CLIFFORD NELSON, parasitologist of the Department of Inland Fisheries and Game for the State of Maine, has been commissioned first lieutenant in the Sanitary Corps and has been assigned to Carlisle Barracks, Pa.

DR. J. S. KASANIN, director of the department of psychiatry of the Mount Zion Hospital, San Francisco, and assistant clinical professor of psychiatry at the Medical School of the University of California, has left for a two weeks' trip to El Paso, Texas. While in Texas, Dr. Kasanin will lecture under the auspices of the Rockefeller Foundation on psychosomatic medicine at the various U. S. Army hospitals of the Eighth Service Command.

FOR a second conference with the Surgeon General of the U. S. Army, Dr. Karl M. Bowman, professor of psychiatry at the Medical School of the University of California and director of the Langley Porter Clinic for mental diseases, San Francisco, has returned to Washington. He is serving as a member of a national committee concerned with the men rejected by induction boards for neuropsychiatric reasons. A report will be submitted to the government.

FACULTY members of the Michigan College of Mining and Technology at Houghton on leave for service in the armed forces include Commander J. H. Service, mathematics and physics; Lieutenant Commanders R. W. Drier, metallurgical engineering, and H. W. Risteen, mechanical engineering; Lieutenant C. J. Pratt, mathematics; Major F. A. Rohrman, chemical engineering; Lieutenants R. F. Lang, civil engineering, and T. E. Vichich, mathematics, and Corporal Vernon Johnson, forestry. Among faculty men on leave of absence as civilian employees of the Army is Professor George W. Swenson, head of the electrical

engineering department. In addition, Professor A. K. Snelgrove, head of the department of geological engineering, and Professor N. H. Manderfield, of the department of mineral dressing, and his entire staff have been assigned to full-time research on strategic minerals. Associate Professors W. A. Seaman and V. L. Ayres of Dr. Snelgrove's staff devote half time to this project. Chemical engineering investigations, among them the recovery of copper and zinc from gilded metal scrap, also form a part of the war research program. This work is in charge of Professor H. L. Coles, head of the department, and to it he and three members of his staff—Dr. Glenn H. Damon and Dr. G. M. Machwart, associate professors, and E. R. Epperson, research engineer—are devoting most of their time.

DR. SELIG HECHT, professor of biophysics at Columbia University, gave an address entitled "Science in Everyday Life" at the opening ceremonies on September 21 of the New School for Social Research, New York City.

THE eleventh E. Starr Judd lecture will be given by Major General Norman T. Kirk, Surgeon General, U. S. Army, War Department, at the University of Minnesota, on Monday evening, December 6, at 8:15 in the Museum of Natural History Auditorium. He will speak on "Surgery in War."

SIR ARTHUR NEWSHOLME bequeathed the residue of his estate to the London School of Hygiene and Tropical Medicine.

THE establishment of Leo F. Rettger Fellowships in the Yale Graduate School has been announced. The fellowships were founded by Dr. Leo F. Rettger, professor emeritus of bacteriology, who retired in June, 1942, after serving for forty years on the faculty. Well known for his researches on animal diseases and intestinal bacteriology, especially on the transformation of intestinal flora, he was the co-discoverer of acidophilous milk and received a patent on the process for producing it. The patent, Dr. Rettger explained, was secured not with the idea of limiting the production of acidophilous milk, but in order that the product might be controlled and made to conform to strict standards. The fund for the fellowships, amounting to $25,000, represents earnings since 1921 from the practical application of research under Dr. Rettger's supervision. Merrill Y. Van Wagoner, of Midway, Utah, and Irene E. Kuslowitz, of Baltimore, Md., have been appointed the first Rettger fellows.

A NEW course in personnel psychology, covering problems of selection and placement, including current applications of psychology to personnel problems of industry, the armed services and government agencies, will be offered jointly during the autumn term by the Graduate School of Arts and Science and the Graduate Division for Training in Public Service of New York University. The instructors, all associated with the Personnel Research Section, Classification and Replacement Branch, Adjutant General's Office, War Department, will be Lieutenant Colonel Marion W. Richardson, U. S. Army, officer in charge, Personnel Research Section; Captain Roger M. Bellows, U. S. Army, officer in charge, Technical Classification Unit, and Dr. Edwin R. Henry, chief, Technical Classification Unit. The course will be offered at the Washington Square Center each Wednesday evening for fifteen weeks.

CHARLES PFIZER AND COMPANY, of Brooklyn, N. Y., has purchased a refrigeration plant near its present property in order to expand the output of penicillin. It is planned to spend about $750,000 on the project, and highest priorities have been obtained for needed equipment, so that work may be completed by the end of this year if possible.

ACCORDING to the *Journal* of the American Medical Association, the Department of Health of Mexico has signed an agreement with the School of Medicine of the Tulane University of Louisiana to establish and maintain a health unit and field training station at Boca del Rio, Vera Cruz, with a full-time resident director and staff. The unit will function as a health center for the welfare of the community and serve as a training center for physicians named by the Department of Health of Mexico, or by Tulane University with the approval of the Mexican department. Patients in the health unit of the city of Vera Cruz and in the hospitals there and those obtained through the facilities of the Institute of Tropical Diseases and other hospitals in Mexico, D. F., and clinic patients of Boca del Rio will be available for study. Funds to construct and equip the building at Boca del Rio will be provided by the Department of Public Health of Mexico and by Tulane University, but the department will provide funds to operate the health unit as such.

A PRELIMINARY statement of Scottish vital statistics for the second quarter of 1943, issued by the Registrar-General for Scotland and reported in *The Times*, London, shows that the birthrate was 20.4 per 1,000 of the estimated population. This is 1.1 above the comparable rate for the second quarter of 1942. It is 1.4 above the average for the corresponding quarter of the previous five years, and is the highest birth-rate recorded in the second quarter of any year since 1930. It is lower than the birth-rates experienced up till the end of the first quarter of this century. The death-rate was 12.7 per 1,000. This is 0.4 below that for the second quarter of 1942, and 0.5 below the five years' average. The marriage-rate was 7.8 per 1,000. This is 2.0 below that for the second quarter of 1942

but 0.2 above the pre-war five years' average. The infantile mortality rate was 58 per 1,000 births. It is 6 below that for the second quarter of 1942 and 10 below the five years' average. It is the lowest rate recorded for the second quarter of any year. The maternal mortality was 3.5 per 1,000 live births.

DISCUSSION

GEOLOGISTS IN WAR SERVICE

THERE has been some recent discussion in SCIENCE concerning the utilization of geologists in the war effort. Very few geologists are satisfied that the full value of the profession or of its personnel is appreciated. However, there has heretofore been an almost complete lack of information on which to base an intelligent discussion. Information on the prewar and wartime occupations of Harvard-trained geologists has been gathered. Data on 318 men are available, as shown in Table I.

TABLE I

Degrees	Total number	Teaching Per cent.	Non-commercial and government research Per cent.	Commercial research Per cent.	Changed position as result of war Per cent.
Ph.D. and S.D.	115	50	14	32	28
M.A. } M.S. } M.E. }	 79	32	18	46	32
Graduate School— no degree ..	73*	31	37	31	44*
A.B. and B.S.	51†	12	63	25	35
Totals	318	34	33	33	33

* Of this total 22 were students in 1941–42 and are omitted in calculating percentages, except in the final column.

† The present occupations of 93 other men with A.B. and B.S degrees are known. These men have gone into occupations other than geology or into the Army, and are not here listed.

Of the total of 318, a third each are employed as teachers, in non-commercial and governmental research and in commercial research. Only two of the teachers are in preparatory work; the rest are in college teaching. The per cent. of Ph.D.'s in this category is the highest, as men planning to teach usually attempt to doctorate. Many of those who have A.B. and A.M. degrees from Harvard hold doctors' degrees from other institutions.

The impact of the war has been severe, and there has been a shift of employment involving 33 per cent. of the total. The shift has been from commercial research into governmental research and administration or into the Army and Navy. Teachers have shifted mostly into commercial research, but most of the teachers have not shifted employment. They have, however, changed courses and adapted their teaching to new demands. Many have spent much time in temporary work for governmental bureaus or in commercial work or strategic minerals. It has been impossible to make estimates of these informal, confidential and part-time efforts, although their total value is large.

The proportion in the Army and Navy is fairly high: 10 doctors; 11 masters; 17 men with graduate work, and 5 bachelors who are recognized geologists or 13.5 per cent. of the total. Students who left college with bachelors' degrees to go directly into the Armed Forces are numerous but not considered. Some of these men intend to be geologists and have adequate training to be useful field assistants.

Of the group in uniform, 17 are mature men who are in specialized positions of research and administration which appear to be suitable to their talents. Men under 40, however, are mostly performing ordinary military or naval duties, for which they are presumably qualified, but which seem below their capacities. Every geologist believes that the Army and Navy need geologists as advisers on construction and on tactics and strategy. If these men were used as geologists, the situation would be more satisfactory. There are also others qualified and willing who could be recruited for duties in military geology.

These data cover the wartime changes in the occupation of a small group only, but a group presumably representative of the geologists who have graduated from other universities. The willingness of geologists to leave their ordinary occupations and assume new duties is obvious—a third have done so. That others are willing may be assumed. It appears, however, that a considerable fraction already in uniform are not being used to the best advantage. Many hesitate to change from one civilian position to another, but would shift to a uniform if they were to be used in a geologic staff.

KIRK BRYAN

CAMBRIDGE, MASS.

APPARENT TIME ACCELERATION WITH AGE

I AM interested in the article on "Apparent Time Acceleration with Age of the Individual," by F. W. Nitardy, appearing in SCIENCE for July 30. The theory set forth is "that elapsed time as measured by the recollection of an individual seemed long or short according to what relationship it had to the individual's total time experience." What is meant of course is a limited period of time in relation to the total time experience.

While the abstract lapse of time is a constant fac-

tor, it is not the only factor. The content of the lapsed time, that is, the events, occurrences, incidents and circumstances experienced during the period of lapsed time, is also a factor. Indeed, it would seem that it is more important than the mere lapse of time.

When the items of the content are new and strange, they appear to be longer in passing than when they are more or less familiar, even though they pass during the same period of time. It is well recognized, for example, that when one takes a first trip of an hour over a road new to the observer, it seems to the observer to take much longer than the same trip does at subsequent times. Also, when the items of the content are reduced to a minimum, as when one remains wakeful in a room for an hour with nothing to do, it seems a very long hour indeed.

The longer one lives the more familiar one becomes with many items which help to form the content of the lapse of time. Consequently, when the more or less familiar items pass in review, it seems to take them a shorter time than it seems to take at the beginning of life when everything is new.

If I remember correctly, some one once asked the late President Harding what phase of the Presidency impressed him most, and that his reply was the degree to which all his experiences in life prior to the Presidency were crowded out of his memory. In other words, because of the many and important items in the content of the lapse of time, a year as President seemed much longer than a year of his childhood then seemed.

It may also be observed that a brief period of danger may seem to be very long. I have heard it stated by boxers who were afraid of being knocked out that a round of the fight seemed like an age. It would appear that the content of the period of time is far more important than its actual length or than the ratio of the period to total elapsed time, in determining how long it seems to the observer.

PETER T. DONDLINGER

IN the issue of SCIENCE for July 30, 1943, F. W. Nitardy, proceeding from the assumption that as one grows older time seems to pass more rapidly, offers the ingenious explanation that each year has an apparent length inversely proportional to the number of years already stored in one's memory.

The assumption itself needs to be qualified; for there are at least limited circumstances in which the time-lapse sensation does not depend chiefly on age. A man of sixty and one of twenty, suffering extreme hardships on a life raft, expect to be rescued in due course. Is time likely to drag for Mr. Twenty but to plunge headlong for Mr. Sixty? Or consider a class one month before the end of the spring term. Pupil Twenty is to take some terrifying examinations and then to work on a job he loathes; and teacher Sixty will depart on a grand tour to which he has looked forward many years. Does age determine which wants a particular unit of time to creep and which to gallop? Some of Shakespeare's relevant observations are, of course, to be found in the second scene of the third act of "As You Like It."

To the extent that the assumption is sound, additional considerations for the subjective shortening of time are discernible. In one's earlier years there are apt to be numerous events (say, dates of parties, holidays, school graduations, marriage, childbirth, promotions) awaited so eagerly that one would be glad to forego the intervening period. After middle life, comparatively few such occasions remain, to be summoned posthaste out of the future. With the overwhelming distractions largely behind us, we are better able to appreciate time, and begin to concern ourselves with its pace.

Moreover, while our interests and associations multiply and we are troubled continually by the awareness of our multifaceted ignorance, the increasing disproportion between the innumerable things we ought or want to do and the few for which we shall have opportunity brings us to the unpalatable realization that time is shrinking.

Above all, there is the factor of apprehension. A decade ago the expression "Life begins at 40" was popularized by a book of that name. Whatever consolations the author may have adduced to support the title, realists know that at forty life begins to end, that they have then gone over the top of the hill and are coasting, brakeless, toward extinction. This is doubtless the primary reason why we oldsters are so dismayedly conscious of the precipitateness with which the years, months, weeks and days vanish. When young, we acted as if our balance in the bank of time were inexhaustible; we can delude ourselves no longer.

FRANK WILEN

BROOKLYN, N. Y.

FOR the apparent speed-up of time with increasing age of the individual, F. W. Nitardy (in SCIENCE, July 30) has a plausible explanation, perhaps the correct one. Other theories are possible. Shakespeare observed the facts even more broadly : witness the duet between Rosalind and Orlando:

"Time travels in divers paces with divers persons" . . . .

"Who does he gallop withal?"

"With a thief to the gallows."

Balzac, in "Le Peau de Chagrin," shows impressively how to youth the inevitable end is a philosophical conception rather than one of the "facts of life," while as the aged approach that end the apparent

speed of passage approaches the infinite. Youth looks forward and would "hasten the day"—of a party, of marriage, of economic competence. Age also looks forward, but to a constantly closer door never willingly approached. The apparent speed of time is warped in a direction opposite to that preferred. To youth it seems to move slowly, because youth would have it move rapidly. To age it seems to move rapidly because age would wish it to move slowly.

Or, to suggest another theory, we tend to measure the speed of time in terms of activity. Youth, on the average, is a period of limited interests and few internal resources. For the child, occupation must be found by some one else. He is easily and often bored. Time goes slowly with him. The adult has so much to do and think that time is never sufficient. It gallops away. Even the senile are fully occupied with issues of comfort and repose which are increasingly of concern to them. Thus time slips by with invisible swiftness.

W. D. ENNIS

STEVENS INSTITUTE OF TECHNOLOGY

FURTHER NOTE ON RUSSIAN NAMES

THE scientific worker with the problem of transliterating Russian names or identifying those transliterated by others will have been gratified by the recent attempts of Drs. Hrdlička (SCIENCE, 97: 243) and Dunlap (SCIENCE, 97: 400) to secure the adoption of a uniform method of transliteration. Certain points, however, need further clarification.

Dr. Dunlap's suggestion that we should be sensible and write "Павлов" as Pavloff" conforms neither with Dr. Hrdlička's recommendations nor with the accepted practice of transliterating into English letters most nearly representing the sounds of the Russian letters. In this case the final consonant in each syllable is the Russian "B," which equals the English "v," and "Pavlov" is the only correct English rendition possible.

When the initial of a Russian name is incorrectly transliterated in a bibliography or file, the reference appears at an incorrect position in the alphabetical arrangement and may be all but lost. "Vavilov" may be found misplaced as "Wawilow," or "Yarkina" as "I͡arkina" or "Jarkina."

The other Russian letters which are most frequently transliterated with confusing results are: "E," equal to the English "ye," as in "yet," with the English "e" reserved for "э"; "Ж," transliterated "zh" and pronounced as the "s" in "measure"; "И," equal to the English "i" and not "y"; "Ц," equal to the English "ts" and not to the German "z"; "Ю," equal to the English "yu" as in "yule"; and "Я" equal to the English "ya" and not the awkward "i͡a" nor the German "j." For the Russian "Ц," the English "ch" as in "cherry" is adequate, is in customary use and retains English characters, available in all printing establishments, in contrast to the Slavic "č." (This note is restricted to Russian transliteration to avoid the dilemma of inconsistency on the one hand or, on the other, questioning of the right of so eminent an authority as Dr. Aleš Hrdlička to his preferred and long-established spelling of his own name.) There seems to be no alternative but that "Щ" be rendered as "shch," clumsy as that may seem, while the Russian "X" is best transliterated as "kh" and aspirated as the German "ch" in "Bach." Had the Waterloo of this summer's Eastern front been properly rendered as "Oryol," we might have been spared some of the heroic but painful linguistic struggles of our radio commentators.

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THE DIET OF CHINESE SOLDIERS AND COLLEGE STUDENTS IN WARTIME

A BRIEF account of the monotonous and simple diet of Chinese soldiers, with the diet of Chinese college students for comparison, will be given in these notes. The information may be useful for those working for practical nutrition and provoke thoughts of those who are interested in the science of human nutrition.

Based upon the 1,178 rations issued in 124 messes in South China in the spring of 1940 and the food consumption data of 11,338 soldiers for a month, a basic ration has been formulated. It consists of 953 grams of rice, 274 grams of leafy vegetables, 10 grams of fat and 13 grams of salt.

The ration provides probably enough calories for an adult having physical work, enough protein, nearly all from rice, and a very small amount of fat, which furnishes less than 3 per cent. of the total calories of the diet. It supplies sufficient iron, barely enough calcium and too much phosphorus from rice, thus with a Ca: P wider than 1: 4. In regard to vitamins, it is worthy of note that practically only from the 274 grams of leafy vegetables the soldier gets his vitamin A in the form of carotene and vitamin C; and from the rice bran left on the low-grade rice he gets his antiberiberi vitamin. The actual vitamin intake can not be estimated correctly because of lack of analytical data and loss of vitamins through cooking.

The efficacy of this ration has been reflected on the nutritional state of soldiers based upon the measurements of 3,298 of them. Their height-weight relationship is just about normal for the average southern Chinese. According to medical examinations of the soldiers, the incidences of vitamin B deficiency are higher in those groups where polished rice is used or the rice water is wasted. It has been found that new

recruits usually have a poorer nutritional state than seasoned soldiers, the explanation of which can not be based only upon diets.

Other dietary surveys made among troops at different localities of the rice-producing area and at different seasons of the year reveal that the formulated basic ration still holds true, except that leafy vegetable is not a constant item, roots being consumed when cheap leafy vegetable is not available. In that case, the vitamin A intake of the soldier probably will be cut to a very low level and the mineral intake too.

In regard to the diet of college students (man) in Kunming, a dietary record of 160 students for two months during different seasons shows that more varieties of foods are listed. An average ration consists of 423 grams of rice, 125 grams of leafy vegetables and tomato; 48 grams of tubers and roots, 68 grams of meat and eggs. It is a better diet than the soldiers' in respect to protein and fat, but still low in minerals and probably in vitamins too. The urine saturation test for vitamin C deficiency has been made. About 50 per cent. of the students tested can be grouped as sub-clinical cases of vitamin C deficiency. Among girl students, many frank cases of vitamin C deficiency have been reported by the school physicians and their bleeding and spongy gums have been promptly cured by intramuscular injection of large doses of ascorbic acid.[1] This nutritional study of the students leads to the supposition that the vitamin C nutrition of Chinese soldiers may be unsatisfactory too. One thing may be interesting to record. Almost no sugar is allowed the Chinese soldiers, and little is consumed.

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QUOTATIONS

SCIENCE AND INDUSTRY

An urgent plea for a greater application of science to industry is made by Sir Harold Hartley in a comprehensive pamphlet entitled "Industrial Research: What it Means to Industry," which is being distributed among industrialists and may be obtained from the Federation of British Industries, 21, Tothill Street, S.W.1.

As a foreword states, it "is written in the confident belief that industrial research is going to be the vital factor in determining the future prosperity of Great Britain." This prosperity "will depend more than ever before upon the efficiency and progressiveness of our industries." The loss of foreign investments "will necessitate a considerable expansion in the value of our exports if we are to increase or even maintain our standard of living.

"This formidable task can only be achieved by using to the full our inventiveness and technical skill both to increase the efficiency of our older industries and to develop new commodities which will hold their own in the markets of the world." Compared with the nineteenth century, opportunities to-day are limited by the spread of industrialization and "because the easy inventions and obvious developments have already been made. . . . In the future the advantages Britain possesses in the skill and traditions of her craftsmen will depend more and more on the science that directs their efforts."

In this country there has not been a general appreciation of the value of science in industry, and the amounts spent on research—"the elixir of life of industry, ever renewing its youth and vigor"—have been correspondingly less than in Germany and the United States. This is in no way due to any lower standing of British science. "In both the world wars British scientists have proved that they can more than hold their own if they are given equal facilities and support. All they need is the same opportunity in peace as in war."

Industrialists will find the detailed account of the organization of research in this country of great interest and value. Making the point that business has a direct interest in seeing that research at universities and in technical colleges is adequately endowed, Sir Harold Hartley states that at any time in the university laboratories a new industry may be born which will meet some human need.

Here, too, we read that the technique of radiolocation was first devised and used for a purely scientific purpose without any thought of its practical application. The large and small industrial firm will find here full guidance on how to set about instituting research and what it will cost.

As to the dividend it will pay, the author points to results in war and peace. "It is estimated (he writes) that the gas-filled lamp developed by Langmuir represents an annual saving in the cost of domestic lighting in this country alone of £50,000,000. The improvement in the efficiency of the petrol engine due to lead ethyl saves over 2,000,000,000 gallons of petrol a year. The use of accelerators for vulcanizing rubber has saved capital outlay on moulds estimated at £16,000,000. Research on motor tires has increased their average life from 3,000 miles to over 20,000 miles.

"Naturally, these vast savings have been reflected

[1] The ascorbic acid used was a gift from Cornell University.

in the profits and prosperity of the industries and firms responsible for these great technical advances. The first question any firm will ask is, What return can we expect from expenditure on research? The answer is partly given above, for there will always be brilliant prizes to be won. But the short answer is that no firm can afford to neglect research, as it is the only safeguard of the future."—*The Time,* London.

SCIENTIFIC BOOKS

SIR J. J. THOMSON

The Life of Sir J. J. Thomson. By LORD RAYLEIGH. x + 299 pp. Cambridge: At the University Press; New York: The Macmillan Company. 1943. $6.00.

IN this book Lord Rayleigh has not only given a dignified and colorful picture of one of the most outstanding pillars of science of the generation which has passed, but he has woven the picture into a most valuable historical development of those discoveries which have been the landmarks of the journey from the territory sown by Newton and Galileo to that in which we live to-day. Truly, in no epoch has the scenery changed as rapidly and with such enhancement in the richness of the foliage. There is absolutely no reason for the partial apology cited by the author in his preface and concerned with the book's being too scientific; for not only are scientific matters treated with a clarity which should leave no stumbling-blocks for the layman, but they are moulded with such skill with the personalities of their discoverers as to make them form a part of the story of the whole romance in which they figure as topics vying in interest, even to the layman, with those topics more particularly concerned with the personal life of J. J. Thomson himself.

Starting with Thomson's early youth, we find him obtaining a scholarship to Trinity College, Cambridge, when Clerk Maxwell was the director of the Cavendish Laboratory. It seems strange to realize that apparently he never met that great pioneer whose work formed so much of the basis of his later discoveries. It is also rather remarkable to learn that he had so little scientific contact with Sir Joseph Larmor, who was his life's contemporary, interested in the same fields of science, but to some extent in the more abstract domains thereof. Thomson himself was a mathematical physicist of no mean order of attainment, as his earlier writings very fully demonstrate. Indeed, later, when, on the retirement of the late Lord Rayleigh from the Cavendish professorship, he was appointed to that position at the early age of twenty-eight, not over-enthusiastic letters of congratulation from some of his rivals for the position expressed surprise at the appointment, founded upon the assumption that he was a mathematician rather than a physicist. It is true that none of his fellow workers, even then or since, have regarded him as much of a manipulator of apparatus. We read that "He had little knowledge of mechanical processes and technique and was at no time ready with his hands." His actual experimental work was always carried out by an assistant, and he was indeed fortunate in his choice of these men. One of them, H. F. Newell, however, writes: "J. J. was very awkward with his fingers, and I found it very necessary not to encourage him to handle the instruments! But he was very helpful in talking over the ways in which he thought things ought to go." We learn that he was an excellent elementary lecturer and insisted upon the importance of numerical examples.

In these days of elaborate equipment, it is interesting to read his account of the difficulties encountered in his very early days as a student of Balfour Stewart at Manchester, for he writes: "It may be worthy of remark that as many of the pieces of apparatus used were required for the ordinary work of the laboratory, the whole arrangement had to be taken down and put together again between each determination." An experienced experimntal physicist of to-day would rather demur against his additional remark on the supposed advantages of this procedure to the effect that "this must have had the effect of getting rid of a good many accidental errors." Even in 1914, after the major portion of his work as Cavendish professor had been completed, we read that about thirty research students were working in the laboratory and the cost of their researches was about £300 ($1,500) per annum.

It is generally recognized that J. J.'s influence in the Cavendish Laboratory was mainly one of general stimulation and encouragement, and that his advice frequently did not extend in useful form down to practical details. This phase is dealt with in entertaining vein with a full understanding that one who can be great in many things can afford his weaknesses in a few. We read of his advising the student to measure the diameter of a quartz fiber by wrapping a spiral thread around it and measuring the length. We read of his conversation with John Zeleny, who had just succeeded in the then by no means easy feat of getting results on ion mobilities for atmospheric ions, and we find him suggesting that results be secured for metallic vapors and coming round, moreover, a few hours later wanting to know if such results had

been obtained. We learn that he considered a slide rule a device for wasting time, and he apparently never used one. On the other hand, there are various citations of profound wisdom and understanding. To a student who complained how uphill research was, he replied: "Yes, that is why there is so much credit in doing anything." We find him deploring the fact that research students of to-day require so much. "They expect," he said, "to be given a properly designed piece of apparatus which will *work*. In the earlier days we had to make it work ourselves as best we could, whatever its natural deficiencies might be." We find him dilating upon the position of industrial research and upon the dangers of fundamental research being done under conditions in which the researcher is paid for his efforts. He ends by stating: "You want this kind of research, but if you pay a man to do it, it will drive him to research of a different kind. The only thing to do is to pay him for doing something else and give him enough leisure to do research for the love of it."

J. J., while a radical in the physics of mid-Victorian times, was very conservative in his own radicalness, and was never happy with even the older quantum theory, apart from the new. We find him quoted as saying in a letter: "Again, I differ from you about the value of the conception of an ether, the more I think of it the more I value it. I regard the ether as the working system of the universe. I think all mass, momentum and energy are seated there, . . ." It would have been perhaps interesting if the book had included some reference to Niels Bohr's association with the Cavendish Laboratory.

Like many of the famous physicists of the nineteenth and early twentieth centuries, J. J. was for a time interested in psychical investigations and is even sufficiently sympathetic towards the phenomenon of water divining to remark that there is no doubt of the reality of the process of "dowsing."

The period of transition between Thomson's resignation of the directorship of the Cavendish Laboratory and the appointment of Rutherford is one which must have been fraught with many delicate considerations. Thomson, having retired from the directorship of the Cavendish Laboratory, had assumed an independent professorship, and the ironing out of responsibilities between a new director as forceful in personality as Rutherford and a retired director as eminent as J. J., and who was still active in the laboratory, must evidently have necessitated rather difficult diplomatic adjustments. Thomson was very evidently anxious to have Rutherford accept the directorship, and his own characteristic modesty is well exemplified by his remarking, in connection with the potentialities which the post afforded, that: "There are very great opportunities for making a very great school of physics at Cambridge. . . ." As the author remarks, Thomson, in this phase, "does not give the slightest hint of what was obviously the fact, that he himself *had* made a very great school of physics at Cambridge, and that the problem for his successor was to maintain it."

It will come as a surprise to many that in spite of the relatively small emoluments pertaining to even such a distinguished man of science, emoluments which do not appear to have been supplemented from such extraneous sources as patents or independent professional activities, J. J. Thomson's will was ultimately proved for no less a sum than 82,000 pounds sterling, which Lord Rayleigh attributes to a skill in investments which would have caused him to have attained distinction in the business world of affairs if he had chosen that line instead of science.

The author stresses everywhere the fact of J. J.'s informality, simplicity and the lovableness of his disposition. We see a man whose great influence on science has come as much through the permeation of his great spirit into the souls of those who surrounded him as by his own researches and formal writings. In reading the book one is conscious, in the reverence and love which the writer shows for his great master, of the absorption within himself of something of that spirit.

W. F. G. SWANN

ORGANIC CHEMISTRY

Textbook of Organic Chemistry. By GEORGE HOLMES RICHTER. Second edition. 6¼ × 9¼ in. 759 pp. Artistically bound in gray and blue cloth. New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. 1943. $4.00.

THE new edition of this excellent text, in its very attractive blue and gray binding, will be warmly welcomed by all who have used or are familiar with its predecessor, which appeared just five years ago.

The changes made in the older edition consist mainly in the rearrangement of old and the addition of new subject-matter. Thus, the discussion of natural products, previously scattered through various chapters, has been assembled in a single chapter and a new section on terpenes added. Many other similar illustrations might be cited. As to new matter, supplementary information has been provided concerning hormones, vitamins, drugs, plastics (including synthetic rubbers), hydrocarbons, gasoline, octane ratings of fuels and halogenation; as well as resonance, tautomerism, the reactions of Claisen, Elbs, Scholl and Stephen; and the rearrangements of Demjanow, Jacobsen and Wagner.

The book is warmly recommended as one of the best in its class.

The Chemistry of the Aliphatic Orthoesters. By HOWARD W. POST. American Chemical Society, Monograph Series, No. 92. 6¼ × 9¼ in. 188 pp. Bound in dark blue cloth. New York: Reinhold Publishing Corporation. 1943. $4.00.

THE volume comprises the following chapters: 1. Introduction; 2. Preparation and General Properties; 3. Reactions with or Catalyzed by Inorganic Acidic Substances; 4. Reactions with Organic Acids, Anhydrides and Halides; 5. Reactions with Nitrogen Compounds; 6. Reactions with Organo-metallic Compounds; 7. Carbohydrate Orthoesters and Orthoacids; 8. Miscellaneous Reactions; 9. Silicoörthoesters: Preparation and Physical Properties; 10. Chemical Properties of Silicoörthoesters; 11. Polyalkoxides of Other Elements of the Fourth Column; and 12. Physical Properties of Orthoesters. An author index and a subject index conclude the work. Numerous tables are distributed throughout the text, and every chapter, except the first one, concludes with an extensive bibliography.

The book is a comprehensive and scholarly compilation and presentation of information widely scattered in chemical literature, and not heretofore brought together in a single volume so far as the reviewer is aware. Our present knowledge of the esters of orthoformic acid, $HC(OR)_3$, of its homologs and of orthocarbonic acid, $C(OR)_4$, has been painstakingly gathered, classified and reviewed. Two chapters are devoted to the silicon analogs of these esters; and one to the polyalkoxides of other elements of the fourth column of the Periodic Table; *viz.* Ti, Ge, Zr, Sn and Pb.

The subject-matter is classified primarily according to the preparation method or type of reaction involved, rather than on the basis of the compounds discussed, and secondarily in chronological sequence.

The author calls attention to the remarkable agreement between the b.p. of a given orthoester and that of its silicon analog, to the stability of the carbon-silicon bond in such compounds and to the fact that silicoörthoesters are subject to hydrolysis in much the same manner as the corresponding carbon compounds.

A valuable and stimulating feature of the book is the attention called to problems in this field which still await solution. The final chapter, on the physical properties of orthoesters, consists of a list of known orthoesters, arranged according to molecular formulas on the Richter-Stelzner Lexikon plan, recording all known physical data, and with a bibliography of 391 titles.

In its chosen field, the volume is in a class by itself and is certainly indispensable to all interested in any way in the chemistry of the aliphatic orthoesters.

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SOCIETIES AND MEETINGS

THE VIRGINIA ACADEMY OF SCIENCE

THE twenty-first annual meeting of the Virginia Academy of Science was held in Richmond on May 12 and 13. It was held in the middle of the week to avoid week-end congestion and in Richmond as an easily accessible place. It was foreseen that it could not be a full-sized, regular meeting and yet 204 registered out of a membership of 300, and seven of the ten sections put on programs.

A group interested in starting a section on statistical methods presented a qualifying program of ten papers.

Three committees were appointed: A committee to function as the Virginia part of the larger committee of the Southern Association of Science and Industry, which is making a survey of the natural resources of the South. A committee to prepare data concerning the natural resources of Virginia for the use and instruction of the school children of the state. A committee appointed, upon invitation of the Virginia Commission of Game and Inland Fisheries, to cooperate with state agencies concerned with conservation.

A special address was delivered on Wednesday night on the "Demographic, Economic, and Social Characteristics of the James River Basin" by Drs. Lorin A. Thompson and Joseph B. Gittler, of the Virginia State Planning Board.

The Virginia Academy of Science Award of $50 was given to Dr. J. B. Myers, of the Blandy Experimental Farm of the University of Virginia, for a paper entitled "Cytogenetics of Phlox," and the Jefferson Prize of $50 was given to Mr. Walter H. Hough, of the Virginia Agricultural Experiment Station at Winchester, Va., for a paper entitled "Development of Vigorous or Resistant Strains of the Codling Moth."

The crowning event occurred at the academy luncheon on Wednesday, when 125 were present. Friends of the academy had offered to contribute $200 a year to the work of the research committee, provided the academy would contribute an additional $400. When this was announced, pledges came in so rapidly that more than the required amount was raised in less than five minutes. No record was made of these oral pledges, but $639 has come in and has been deposited in the bank. This will about double the amount of

oney the research committee will have available each ear for the encouragement of research in Virginia.

The officers elected were the following: Major W. atesby Jones, *President;* Dr. Robert F. Smart, *President-Elect;* Dr. E. C. L. Miller, *Secretary-Treasurer;* Dr. Sidney S. Negus, *Assistant Secretary.*

E. C. L. MILLER,
Secretary

SPECIAL ARTICLES

ISOLATION AND CHARACTERIZATION OF INFLUENZA VIRUS B (LEE STRAIN)[1]

THE influenza virus A (PR8 strain) has been isolated from virus-infected chick embryo chorio-allantoic fluid in preparations of high homogeneity with respect to particle kind.[2] The particles, which behaved as the virus and which consisted of a lipoprotein complex containing nucleic acid of the desoxypentose type, were revealed in the electron microscope as ovoid or kidney-shaped images of variable size corresponding to particles of 77.6 mμ average diameter. Sedimentation velocity diagrams showed a single slightly diffuse boundary. The sedimentation constant was $S_{20°} = 724 \times 10^{-13}$, which with the assumption of a spherical shape for the particles and a density of 1.2,[3] gave a value of 80 mμ for the particle diameter. In the present paper are described briefly the results of similar studies of the Lee strain of the influenza virus B.

The influenza virus B was cultivated in the chorio-allantoic sac of 11-day-old chick embryos. After 42 to 48 hours' incubation at 37° C. following inoculation with the virus, the chorio-allantoic fluid was drawn off, cleared of aggregates by angle centrifugation, dialyzed 24 hours at 2–5° C. against flowing Ringer-calcium chloride solution,[2] and cleared again by angle centrifugation. The fluid was adsorbed twice with adult chicken red blood cells from which the virus was eluted in one fourth the original volume for 2.5 hours at room temperature (24 to 28° C.). The eluate was twice adsorbed in like manner and elution carried out as before. The second eluate was then ultracentrifuged at 27,000 g for one hour, and the resulting pellets were dissolved at 150 times concentration with respect to volume. The pellet suspension was spun at 11,000 g for 2 minutes to remove aggregated material.

In this process, practically all the red blood cell agglutinating capacity and the infectious properties of the chorio-allantoic fluid were carried into the second eluate. Ultracentrifugation of the eluate at 27,000 g for 1 hour resulted in sedimentation of about 90 per cent. of these biological characters. The low-speed centrifugation at 11,000 g was associated with a further small loss of the red blood cell agglutinating capacity and infectivity, leaving about 40 to 70 per cent. of these properties in the clarified concentrates. The concentrates reacted specifically in complement fixation and precipitation reactions with the sera of ferrets and rabbits immunized with mouse lung infected with this strain of the virus.

Electron micrographs of the purified virus concentrates showed rounded or ovoid images of variable size indicating an average particle diameter of 98 mμ. Exceedingly little extraneous material was present. Definite differentiation of structure within the individual particles was indicated by an approximately centrally placed area of relatively high density. The chorio-allantoic fluid and the inactive fractions—the supernate after adsorption with red blood cells and the supernate of ultracentrifugation—contained large numbers of amorphous particles of all sizes, but many especially of about 40 mμ to approximately the size of the virus particle. Particles of this range of diameter were not seen in chorio-allantoic fluid from normal embryos or in the fluid or comparable fractions of it from embryos infected with influenza virus A.[2]

Sedimentation velocity diagrams showed a single slightly diffuse boundary corresponding to a sedimentation constant of $S_{20°} = 832 \times 10^{-13}$. From the sedimentation constant and the specific volume, 0.865, determined by pyknometer measurement, assuming a spherical shape, the calculated particle diameter was 100 mμ.

Suspensions of the concentrated material were opalescent and bluish. Positive biuret, ninhydrin and Millon tests were obtained. The glyoxylic acid and Molisch tests were negative. A positive reaction was seen in Bial's reagent after hydrolysis of the material with 10 per cent. sulfuric acid. This and a weakly positive Dische diphenylamine reaction indicate the presence of desoxypentose. The nitrogen content of the material dehydrated over P_2O_5 varied from 9.6 to 10.4 per cent.

[1] This work was aided by the Dorothy Beard Research Fund and by a grant to Duke University from Lederle Laboratories, Inc., Pearl River, N. Y. The investigation was also supported through the Commission on Acute Respiratory Diseases, Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army, Preventive Medicine Service, Office of the Surgeon General, U. S. Army, and by grants from the Commonwealth Fund, the W. K. Kellogg Foundation, the John and Mary R. Markle Foundation and the International Health Division of the Rockefeller Foundation to the Board for the Investigation and Control of Influenza and Other Epidemic Diseases for the Commission on Acute Respiratory Diseases.

[2] A. R. Taylor, D. G. Sharp, D. Beard, J. W. Beard, J. H. Dingle and A. E. Feller, *Jour. Immunol.*, in press.

[3] W. J. Elford and C. H. Andrewes, *Brit. Jour. Exp. Path.*, 17: 422, 1936.

In preliminary chemical studies, fractionation by the procedures of Kirk[4] and Kirk, Page and Van Slyke[5] showed that about 20 per cent. of the material were soluble in petroleum ether. Of this, 5.7 per cent. were in the form of neutral fat, 10.2 per cent. were phospholipid and 5.1 per cent. cholesterol. The alcohol-ether insoluble fraction constituted about 65 per cent. of the material and contained phosphorus to the extent of 0.27 per cent. of the whole virus. If all this phosphorus were present in nucleic acid, the whole virus complex would contain about 3 per cent. nucleic acid.

The yield of the purified material in all experiments averaged about 2 mg per 100 cc of chorio-allantoic fluid. On the basis of nitrogen precipitable with trichloracetic acid the degree of concentration for practical conditions was about 20 times and on the basis of volume it was 150 times. The specific 50 per cent. point infectivity for chick embryos varied from $10^{-11.2}$ to $10^{-12.1}$ grams per 0.1 cc inoculum with an average of $10^{-11.4}$ grams corresponding to 6,600 particles. The quantity of virus giving the 2_+ red blood cell agglutination end point was $10^{-6.5}$ grams.

The findings indicate that the influenza virus B is a relatively large particulate complex consisting of lipoprotein with which is associated nucleic acid of the desoxypentose type. From electron micrography, the average diameter of the spherical or ovoid bodies was 98 mμ. The diameter calculated from the sedimentation constant, $S_{20^\circ} = 832 \times 10^{-13}$, the specific volume, 0.865, and an assumed spherical shape was 100 mμ. The influenza virus B (Lee strain) thus appears to be significantly larger than the influenza virus A (PR8 strain).

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[4] E. Kirk, *Jour. Biol. Chem.*, 106: 191, 1934.
[5] E. Kirk, I. H. Page and D. D. Van Slyke, *Jour. Biol. Chem.*, 106: 203, 1934.
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THE ETHER SOLUBLE FRACTION OF NAVY BEANS AND THE DIGESTION OF STARCH

DURING the course of experiments dealing with the digestibility of dried navy beans it was observed that the oil of these beans retards the digestion of soluble starch by pancreatic amylase *in vitro*. The degree of this action appears to be of sufficient magnitude to warrant detailed study and comparison with other fats. It was also found that the retarding influence of the bean oil can be overcome to a large degree by a treatment with yeast. The object of this preliminary note is to briefly describe some of these findings.

Oil having these interfering properties can be readily obtained by extracting finely ground navy beans with ether for about one week. The total fat-soluble fraction when added to soluble starch in the same concentration in which it occurs in the beans retards the digestion of the starch more than some of the other edible fats. The amount of pancreatic amylase which completely digests 50 cc of a 1 per cent. solution of untreated soluble starch at pH 7 in less than thirty minutes *in vitro* leaves the treated starch incompletely digested after forty-eight hours.

Starch impregnated with the same amount of butter, lard or olive oil shows a negative starch-iodine test at about the same time as the untreated control. These findings are summarized in Table I. The oil which is quickly extracted from coarsely ground beans instead of allowing the usual period of one week for extraction does not retard the digestion. The difference in digestibility can not be attributed to the action of the ether on the oil.

TABLE I

Fat added to starch in concentration of 1.5 per cent.	Starch-iodine test	
	½ hour digestion	48 hours digestion
bean oil	strongly positive	strongly positive
lard	negative	negative
butter	negative	negative
olive oil	negative	negative

The amount of starch which remains undigested in the presence of the bean oil varies with the age of the starch-oil preparation. In fresh preparations about half of it is undigested after two hours under the above conditions. As the age of the preparation increases the starch becomes less digestible until the inhibition is essentially complete in those preparations which have stood several months. A similar preparation of starch and olive oil becomes less digestible after standing for an equal period but is considerably more digestible than the starch impregnated with bean

il. The relative difficulty with which the interfering actor in the bean oil is extracted from the beans and s increased effectiveness as the starch-oil preparaons age suggests that the firmness of the association f the oil with the starch may account for its action. Various means of overcoming this interference were ied. The method which appears to be most practical rom a nutritional point of view involves a preliminary treatment with yeast. After incubating the undissolved starch-oil preparation with yeast and heating the preparation at 100° for 30 minutes the starch reated with bean oil is then digested by pancreatic mylase at about the same rate as untreated starch. his is true for both new and old starch-oil preparaions. The yeast employed does not significantly diest the starch nor does the heated yeast hydrolyze altose. Likewise, a similar treatment of whole navy beans approximately doubles the rate of hydrolysis of the bean starch by pancreatic amylase. In this respect the treated beans compare more favorably with other common starchy foods. Heating the beans in dilute acid followed by neutralization further compensates for the delayed digestion. It is believed that a similar fat-soluble factor occurs in some other foods and preliminary studies indicate that other enzymes are influenced by this substance. It appears to be especially prominent in soybeans.

In view of some of the present nutritional problems and the increased use of soybeans the significance of this factor is being studied in detail.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE PROTECTIVE ACTION OF GLUCOSE IN BOVINE PLASMA AGAINST HEAT COAGULATION[1]

BEILINSSON[2] found that sucrose and glycerol inhibited the heat coagulation of egg albumin. Newton and Brown[3] showed that sucrose and glucose prevented coagulation of plant sap proteins by freezing. The protective action of other sugars against heat coagulation of egg albumin and the nature of the protection have been investigated.[4]

Van Der Scheer and co-workers[5] have studied the changes occurring in horse serum when it is heated to 60° to 65° C. for short intervals. They were able to show the presence of a new component by electrophoretic analysis. The new component was labeled "C." Evidence was presented to show that this component was a colloidal aggregation product resulting from the denaturation of constituents in the serum.

The present study demonstrates the protective action of glucose against the formation of the "C" component in heated bovine plasma by using the moving boundary technique of electrophoretic analysis.[6]

Normal bovine plasma obtained from citrated blood was utilized. One aliquot of the plasma was saturated at room temperature with glucose, stoppered and then heated at 65° C. for one hour in a constant temperature water-bath. At the end of this period of heating, the sample was perfectly clear and no coagulation was evident. The glucose was removed by dialysis against physiological salt solution. A second aliquot was heated in its native form under the same conditions. However, in this case a coagulum formed during the heating period which was later removed by centrifugation. The remaining aliquot was not heated and

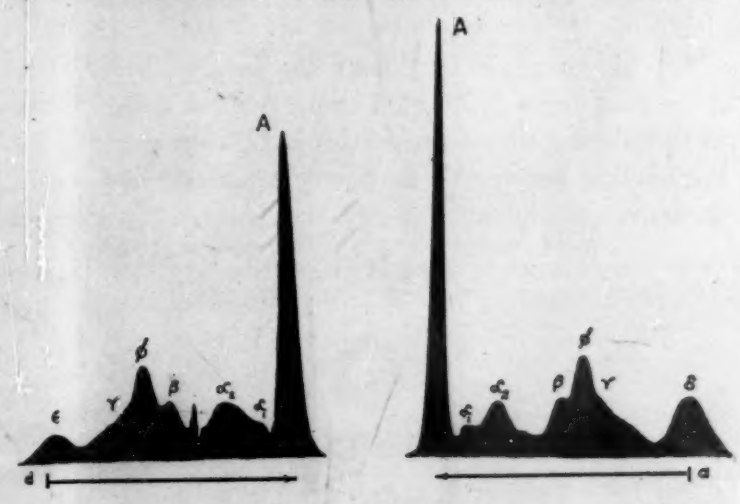

FIG. 1

served as a control. The three samples were then adjusted to a protein concentration of 2 per cent. and dialyzed for 3 days against large volumes of a diethyl barbituric acid—sodium diethyl barbiturate buffer of pH 8.6 and 0.1 ionic strength. Electrophoretic analyses of the samples were then carried out in a manner previously described at 0° C. for 10,000 seconds at a potential gradient of 6 volts.[7]

[1] From the Bacteriology Section of the Michigan Agricultural Experimental Station and the Kedzie Chemical Laboratory, East Lansing, Michigan. Journal article No. 652 from Michigan Agricultural Experiment Station.

[2] A. Beilinsson, *Biochem. Zeits.*, 213: 399, 1929.

[3] R. Newton and W. R. Brown, *Can. Jour. Research*, 5: 87, 1931.

[4] C. D. Ball, C. R. Hardt, R. J. Westfall and W. J. Duddles. In process of publication.

[5] J. Van Der Scheer, R. W. Wyckoff and F. L. Clarke, *Jour. of Immunol.*, 40: 39, 1941.

[6] A. Tiselius, *Trans. Faraday Soc.*, 33: 524, 1937.

[7] C. L. San Clemente and I. F. Huddleson, *Mich. Agr. Exp. Sta. Bul.* 182, p. 3, 1943.

Fig. 1 shows the electrophoretic pattern obtained from the normal unheated plasma. Fig. 2 was obtained from the sample that was heated for one hour at 65° C. in the absence of glucose. A decrease in the areas of all the visible constituents as compared with the normal plasma in Fig. 1 is evident. The

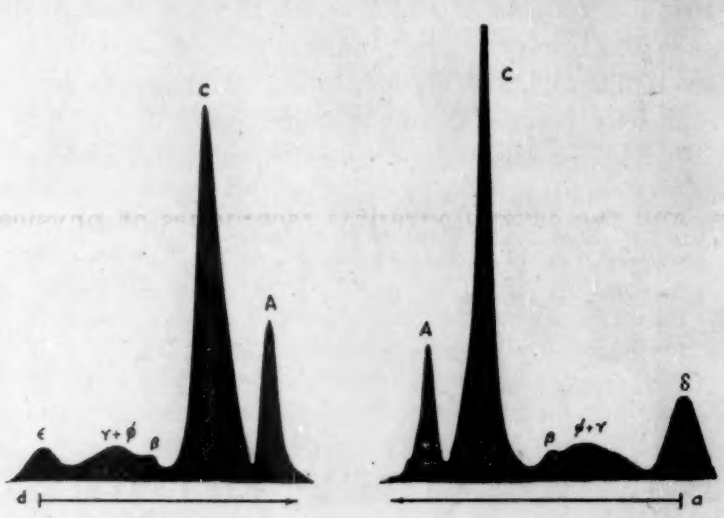

FIG. 2

"C" component appears in the region of the alpha globulins, and its concentration is such that the peak on the ascending side extends beyond the plate. Fig. 3 shows the effect of heating the plasma in the presence of saturated glucose. The pattern does not show the "C" component after this condition of heating. However, the fibrinogen, beta and gamma globulin areas have decreased while a small new peak (x) is observed in the descending pattern next to the alpha-2 globulin.

The sharp peaks (y) near the beta globulin patterns may have originated from normal constituents in the plasma whose properties have been changed by the heating process or they may represent lipide disturbances.

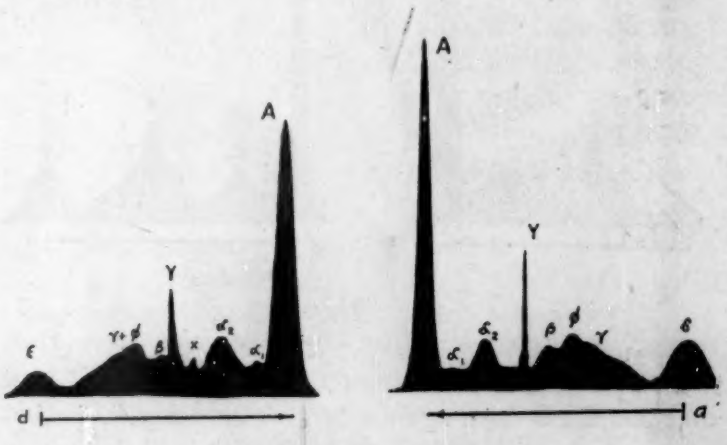

FIG. 3

In Table 1 are set forth the calculated mobilities of the components of the different samples. There is close agreement between values for all plasma samples. No significant differences in mobilities have been observed between normal plasma and plasma heated at 65° C. in the presence of saturated glucose.

TABLE 1

Sample description	Mobilities $u \times 10^{-5}$									
	A	α^1	α^2	C	x	y	β	ϕ	γ	$\phi+\gamma$
Normal plasma	6.78	6.04	5.35				3.53	2.75	2.48	
Plasma and glucose heated at 65° C	6.55	5.82	4.81		4.16	3.60	3.31	2.62	2.11	
Plasma heated at 65° C	6.86			5.08			3.39			2.3

It is believed that the protective action of glucose against the heat coagulation of plasma proteins may be of considerable significance in studies pertaining to proteins. Further investigations of this nature are in progress and will be reported on at a later date.

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BOOKS RECEIVED

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